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STAINLESS STEEL
MATERIAL SAFETY
DATA

ESCO CORPORATION
2141 N.W. 25TH AVE., P.O. BOX 10123
PORTLAND, OREGON 97210

USEPA SF



1265399



2141 N.W. 25TH AVENUE P.O. BOX 10123 PORTLAND, OREGON 97210 U.S.A.
TELEPHONE (503) 228-2141 TELEX 36-0590

Stainless Steel

QUICK IDENTIFIER (In Plant Common Name)

Material Safety Data Sheet

Name	ESCO CORPORATION	Emergency Telephone No.	(503) 228-2141
Address	2141 N.W. 25TH AVE., P.O. BOX 10123 PORTLAND, OREGON 97210	Other Information	TELEX 36-0590
Signature of Person Responsible for Preparation		Date Prepared	3-15-88

SECTION 1 - IDENTITY

Trade Name and Synonyms	STAINLESS STEEL 2XX TO 5XX SERIES		
Chemical Name	STAINLESS STEEL	Chemical Family	STEEL
Formula	N/A		

SECTION 2 - HAZARDOUS INGREDIENTS

Principal Hazardous Component(s) (chemical & common name(s))	%	CAS No.	Permissible Exposure Limit (units)
SEE SECTION 2 OF ATTACHMENT			

SECTION 3 - PHYSICAL AND CHEMICAL DATA

Boiling Point	NOT APPLICABLE (N/A)		Specific Gravity (H ₂ O=1)	ABOUT 7	Vapor Pressure (mm Hg)	N/A
Percent Volatile by Volume (%)	N/A	Vapor Density (Air = 1)	N/A	Evaporation Rate (____ = 1)	N/A	
Solubility in Water	N/A		Reactivity in Water	N/A		
Appearance and Odor	ODORLESS SOLID WITH METALLIC LUSTRE					

SECTION 4 - FIRE AND EXPLOSION DATA

Flash Point (Method Used)	N/A	Flammable Limits	N/A	Lel	Uel	Auto-Ignition Temperature	N/A
Extinguisher Media	NO FIRE OR EXPLOSION HAZARDS						

Special Fire Fighting Procedures	N/A
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Unusual Fire and Explosion Hazards	N/A
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SECTION 5 - REACTIVITY DATA

Stability	Unstable <input type="checkbox"/>	Conditions to Avoid	NONE
	Stable <input checked="" type="checkbox"/>		

Incompatibility
(Materials to Avoid) NONE

Hazardous
Decomposition Products SEE SECTION 6 OF ATTACHMENT

Hazardous	May Occur <input type="checkbox"/>	Conditions to Avoid	NONE
Polymerization	Will Not Occur <input checked="" type="checkbox"/>		

SECTION 6 - HEALTH HAZARDS

Threshold Limit Value
(see section 2) SEE SECTION 2 OF ATTACHMENT

Signs and
Symptoms of Exposure 1. Acute Overexposure SEE SECTION 6 OF ATTACHMENT

2. Chronic Overexposure SEE SECTION 6 OF ATTACHMENT

Medical Conditions Generally
Aggravated by Exposure

Chemical Listed as Carcinogen or Potential Carcinogen	National Toxicology Program	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	I.A.R.C. Monographs	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	NIOSH	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Emergency and
First Aid Procedures

1. Inhalation IF IRRITATION OR PULMONARY SYMPTOMS DEVELOP, CONSULT A PHYSICIAN.

2. Eyes IF IRRITATION DEVELOPS, CONSULT A PHYSICIAN

3. Skin IF IRRITATION DEVELOPS, CONSULT A PHYSICIAN

4. Ingestion IF CONSUMED WATER CONTAINING METAL PARTICLES CONSULT A PHYSICIAN

SECTION 7 - SPILL, LEAK, AND DISPOSAL PROCEDURES

Steps to be Taken in Case
Material is Released or Spilled N/A

Waste Disposal Methods
N/A

SECTION 8 - SPECIAL PRECAUTIONS

Precautions to be Taken
in Handling and Storage N/A

Other Precautions
N/A

SECTION 9 - SPECIAL PROTECTION INFORMATION

Respiratory Protection
(Specify Type) SEE SECTION 9 OF ATTACHMENT

Ventilation	1. Local Exhaust	2. Mechanical (General)	3. Special
			SEE SECTION 9 OF ATTACHMENT

Protective Gloves	Eye Protection	SEE SECTION 9 OF ATTACHMENT
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Other Protective Clothing or Equipment	SEE SECTION 9 OF ATTACHMENT
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SECTION 2 - HAZARDOUS INGREDIENTS*

INGREDIENT	CAS NUMBER	PERCENT	OSHA PEL (MG/M ³) 8-HOUR TWA	ACGIH TLV (MG/M ³) 8-HOUR TWA
IRON	7439-89-6	0-90	10.0 (OXIDE FUME)	5.0 (WELDING FUMES)
CHROMIUM	7440-47-3	0-30	0.025 (CHROME)	0.5 CR (III) 0.05 CR (IV)
NICKEL	7440-02-2	0-99.5	0.015 (METAL)	1.0 (METAL)
MANGANESE	7439-96-5	0-15	5.0 (DUST CEILING)	5.0 (DUST CEILING) 1 (FUME) 3 (STEL)
SILICON	7440-21-3	0-3	5 (RESPIRABLE DUST) 15 (TOTAL DUST)	5 (RESPIRABLE DUST) 10 (TOTAL DUST)
MOLYBDENUM	7439-98-7	0-5	5 (SOLUBLE COMPOUNDS) 15 (INSOLUBLE COMPOUNDS)	5 (SOLUBLE COMPOUNDS) 10 INSOLUBLE COMPOUNDS)
SELENIUM	7782-49-2	0-1	0.2	0.2
COBALT	7440-48-4	0-1	0.1 (FUME AND DUST)	0.05 (FUME AND DUST)
COPPER	7440-50-8	0-5	0.1 (FUME) 1 (DUST AND MIST)	0.2 (FUME) 1 (DUST AND MIST)
TITANIUM	7440-32-6	0-6	N/A	10 (OXIDE)
ALUMINUM	7429-90-5	0-4.25	5 (WELDING FUME) 10 (TOTAL OXIDE DUST)	5 (RESPIRABLE DUST) 5 (WELDING DUST)
VANADIUM	7440-62-2	0-1.1	0.1 (OXIDE FUME CEILING) 0.5 (RESPIRABLE DUST)	0.05 (RESPIRABLE DUST) 0.05 RESPIRABLE FUME)
TUNGSTEN	7440-33-7	0-2	N/A	5 (INSOLUBLE COMPOUNDS) 1 (SOLUBLE COMPOUNDS)



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*NOTE: LISTED BELOW ARE PERTINENT ABBREVIATIONS.

CAS	=	CHEMICAL ABSTRACT SERVICE REGISTRY
OSHA	=	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PEL	=	PERMISSIBLE EXPOSURE LIMIT
MG/M ³	=	MILLIGRAMS PER CUBIC METER OF AIR
TWA	=	TIME WEIGHTED AVERAGE
ACGIH	=	AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS
TLV	=	THRESHOLD EXPOSURE LIMIT
STEL	=	SHORT TERM EXPOSURE LIMIT

** = THIS TABLE DOES NOT INCLUDE ALL COMMERCIAL AVAILABLE ALLOYS. DEPENDING ON THE GRADE OF STAINLESS STEEL, THE PERCENTAGE OF INGREDIENT MAY VARY. MINUTE QUANTITIES OF TRACE ELEMENTS MAY ALSO BE PRESENT.



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SECTION 6 - HEALTH HAZARDS

Signs and Symptoms of Exposure

In the natural state, steel products do not present inhalation, ingestion or contact health hazards. However, welding, burning, grinding, brazing, sawing, or machining can result in product temperature to reach or exceed its melting point or result in the generation of fumes and/or airborne dust (particulates). Metal fumes and dusts may pose health hazards and should be performed in well ventilated areas. Inhalation of fumes and dust are the major potential health hazards.

Acute Overexposure

Irritation of eyes, nose and throat may result from excessive exposure to metal fumes and dusts. Metal fume fever may result from high concentrations of fumes and dusts of iron oxide and manganese. A metallic taste in mouth, irritation and dryness of mucous membranes, fever and chills usually lasting 12 to 48 hours are typical symptoms commonly associated with metal fume fever.

Chronic Overexposure

Excessive prolonged inhalation of high concentrations of metal welding fumes and dust may lead to the conditions listed with each element.

- | | | |
|-----------|---|--|
| Iron | - | as oxide, pulmonary effects, siderosis. |
| Chromium* | - | dermatitis, upper respiratory tract inflammation and/or ulceration, and possibly cancer of nasal passages and lungs. Available information concludes that welding fumes exposure does not induce human cancer. |
| Nickel* | - | dermatitis, upper respiratory tract inflammation and/or ulceration, and possibly cancer of nasal passages and lungs. Available information concludes that welding fumes exposure does not induce human cancer. |
| Manganese | - | bronchitis, pneumonitis, loss of coordination. |



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- Silicon - may produce x-ray changes in the lungs without disability.
- Molybdenum - irritation of the nose and throat, weight loss, and digestive disturbances in animals. No industrial poisoning has been reported.
- Selenium - nasal and bronchial irritation, gastrointestinal disturbances, garlic breath odor.
- Cobalt - respiratory tract irritation, skin rash.
- Copper - "metal fume fever" - symptoms may include cough, headache, metallic taste in mouth, nausea, fever, chilling, pain in muscles and joints. This condition is transitory, usually lasting one (1) day or less.
- Titanium - no chronic debilitating symptoms reported in humans.
- Aluminum - no known adverse health impacts on humans. Considered as nuisance dust in occupational settings.
- Vanadium* - common respiratory disease such as bronchitis, pneumonitis and allergic asthmatic reaction and lung cancer.
- Tungsten - some evidence of pulmonary discomfort such as cough.

*Considered as a carcinogen or potential human carcinogen.



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SECTION 9 - SPECIAL PROTECTION INFORMATION

Following personal protective equipment may be required while workers involve in welding, cutting, grinding, chipping, milling, or other works on stainless steel products. Levels of protection required is a function of alloy type, workplace environment, and potential hazards anticipated.

Respiratory Protection

Use NIOSH - approved particulate and/or acid fume respirator if the concentration of actual or potential airborne contaminant exceeds, or is anticipated to exceed, the exposure limits listed in Section 2 of attachment.

Ventilation

Fumes and waste gases should be removed at source by means of local exhaust ventilation. If local exhaust ventilation is not adequate or cannot be provided, then a high level of powered ventilation will be required.

Protective Gloves, Eye Protection and Other Protective Clothing or Equipment.

Use safety goggles, glasses, boots, aprons, helmet, hand-shield, earplugs, and muffs as needed to protect workers from physical, electrical, radiation and noise hazards.